MINING ON SEWARD PENINSULA.

By GEORGE L. HARRINGTON.

PLACER MINING.

SUMMARY OF MINING CONDITIONS.

During the summer of 1919 climatic conditions on Seward Peninsula were generally favorable for placer mining until the later part of September and the first few days of October, when a heavy freeze and snow cut off the water supply and necessitated the closing down of most of the plants. A brief thaw a little later permitted resumption of work for a short time, but the greater number of plants were closed down for the winter by the 1st of October, only the dredges and a few of the larger plants continuing mining after that date and most of the latter working with reduced crews. Throughout the winter season the labor situation was not satisfactory, and there was relatively little winter work. In summer the situation improved somewhat, but the 8-hour shift was accepted by a number of operators only with the greatest reluctance, especially where additional labor was not obtainable or other conditions were not such as to make a second shift practicable. At numerous places on the peninsula many of the plants were obliged to work short-handed, and a few used Eskimo labor.

Gold, tin, and platinum were recovered through some of the various methods of placer mining. No information was obtained regarding the saving of scheelite as in previous years as a by-product of placer mining for gold. Difficulty had been experienced in marketing the product in the past, and this, in connection with the labor involved, appeared to make the saving not worth while.

Gold was recovered from most of the operations, and tin (cassiterite) was obtained as usual from the York region, also in small amount as a by-product of gold mining on Goodhope River. Platinum was recovered with gold from the placer operations in the Koyuk and Buckland drainage area.

During the summer work was continued on several projects of direct or indirect benefit to the mining industry. The east jetty of the Snake River harbor was completed, and the channel was dredged to permit the entrance of small schooners to a secure harbor and their

loading and unloading without lightering, an important item in the coastwise transportation of supplies from Nome.

Work was also continued on roads throughout the peninsula, and the Candle Creek road was completed as far as claim No. 16 above Discovery, Candle Creek. At Nome the road was completed to Cape Nome. A road has also been constructed from the landing on the Koyuk to the center of mining operations on Dime Creek.

The Kougarok region appears to have the poorest transportation facilities. At present the main line of transit is the railroad, over which is run the "dogmobile." No repairs have been made on this railroad for several years, and according to reports its state of disrepair makes travel over it hazardous. The need is acute of either the construction of a wagon road or the repair and operation of the railroad to serve the needs of the miners in the Kougarok River and Iron Creek districts.

Under present conditions of operation there is frequently a shortage of much needed repair parts in Nome, as the hardware stores have decreased their stocks to include only the staple and more quickly salable goods. This has worked a very great hardship on some operators when they were in need of castings for repairs. It would appear that this difficulty might be met by the cooperative purchase of a small electric furnace, such as has been installed at Treadwell, for the making of emergency castings, thus doing away with the delay incident to shipment from Seattle. Under conditions of shipping such as prevailed in 1919 this delay may amount at times to a month or more, which may be one-third of the working season.

THAWING OF FROST IN GRAVELS.

For some years thawing has been one of the main problems in connection with the dredging of the low-grade auriferous gravels of the Nome coastal plain. The method of thawing by a series of drainage ditches and laterals in conjunction with natural drainage courses has been described in general terms by Eakin[1] and has received some consideration by owners and engineers in charge of dredging operations. At present consideration is being given to the project of making such a drainage canal to enter Snake River near the mouth of Center Creek. The initial cost and the uncertainty as to the extent of the thawed ground that would result, as well as the divided ownership of the ground, have been the main deterrents to the carrying out of this project and similar large-scale thawing operations.

Standard practice in thawing frozen gravels throughout Alaska and northern Canada has hitherto involved the use of steam. As

[1] Eakin, H. M., Placer mining in Seward Peninsula: U. S. Geol. Survey Bull. 622, pp. 368-369, 1915.

the tenor of the workable gravels has decreased, efforts to lower operating expenses have resulted in changes in details of the process, and each plant has varied the length of points, their spacing, and the time of application of steam. The greatest economies appear to have been effected by decreasing the time during which steam is applied under pressure and allowing a longer period of sweating, thus securing greater thawing efficiency for the heat units applied. Experimental work [2] has proved the possibility of cold-water thawing, and a number of plants have thawed frozen gravel by this method.

In 1919 cold-water thawing was used by three dredges on Seward Peninsula. On Candle Creek the Candle Creek Mining Co.'s dredge pumped water to a tank on the hillside, giving it an opportunity to warm up somewhat before being used in thawing. An even pressure was also insured by this method. In the Council region ditch water under head was used. At Nome the Alaska Mines Corporation thawed ground in advance of dredging on Flat Creek by cold water, obtaining pressure by pumping direct to the points. It is probable, however, that this company will utilize ditch water under a head, instead of pumping. Two dredges in the Iditarod district also used cold water for thawing.

Details of the processes used at all these plants are not at hand, but at the plant of the Alaska Mines Corporation, Nome, the temperature of the water used for thawing was about 55° F. It left the frozen ground at a temperature of about 34° or 35° F. After the ground is thawed the temperature of the water as it leaves is practically the same as that at which it enters. The maximum thickness of gravels thawed in 1919 was 42 feet, with as much as 20 feet of clayey material. It was stated that no trouble from unthawed blocks was experienced throughout the summer in the dredging operations. Points were spaced 10 feet on centers and left in for 7 days, and a pressure of 25 pounds was maintained by pumping. In shallower ground, 7 to 10 feet deep, at Council, where ditch water was used, points spaced 5 feet on centers were left in 48 hours.

GOLD.

Placer gold is recovered on Seward Peninsula by dredging, by underground mining, and by open-cut work including shoveling in, the use of the hydraulic giant for stripping and mining, the use of the hydraulic lift, and the use of the open hydraulic lift on the Ruble elevator. In addition to the plants engaged in producing gold, a number were doing preparatory work, such as the construction of ditches and the stripping of barren surface material from the auriferous gravels to be mined later, and in prospecting. The prospecting was mainly in the nature of proving ground already held, rather than

[2] Cathcart, S. H., Mining in northwestern Alaska: U. S. Geol. Survey Bull. 712, pp. 190–194, 1920.

a search for new deposits. In general, relatively little new development of unproved ground was attempted, mainly on account of legislation permitting the holding of title to claims without the doing of assessment work.

DREDGING OPERATIONS.

During the summer of 1919 a total of 22 gold dredges were in operation for varying periods, as compared with 21 in 1918. They were distributed as follows: Nome district, 7; Council district, 8; Solomon district, 4; Kougarok, Fairhaven, and Port Clarence districts, 1 each. A number of other dredges were idle for various reasons, chiefly on account of reconstruction or moving to other localities. Some were idle, however, while additional areas were being proved or prepared for dredging. In the Nome district the Alaska Mines Corporation operated one dredge on Flat Creek, but the other dredges of this company were idle, though some were undergoing repairs and reconstruction. James Bellevue was rebuilding a dredge on Dry Creek. The Bangor and Hastings Creek dredges, operated in 1918, were idle in 1919. Included in the list of dredges in the Nome district is that operated by William Rowe on Snake River, primarily for the purpose of deepening the channel of the river as a part of the Nome harbor project; but the dredge was also operated to save the gold content of the gravels handled.

In the Council district the Crooked Creek and Melsing Creek dredges were again working. The Moody Mining Co.'s dredge was idle, but the company expects to operate this dredge in 1920. Changes contemplated for 1920 include moving the Elkhorn dredge (G. & O. Dredging Co.) to Warm Creek and the Camp Creek dredge of the Uplift Mining Co. to Golofnin.

At Solomon four dredges were operating, as compared with five in 1918, the Scott & Newburg dredge being idle. One of the Kimball dredges was dismantled for shipment to Kuskokwim River. This dredge was in Seattle late in 1918, awaiting transportation.

During the summer of 1918 the Kelliher dredge in the Kougarok was idle, the owners being engaged in stripping ground for future operations. In the Port Clarence district, neither the Dobson dredge nor that of the Alaska American Gold Mining Co. (Bernard dredge) has worked regularly since 1917. During the summer of 1919 prospecting was being done by the owners of the Dobson dredge, with a view to the resumption of operations. A dredge reported to have been brought from Serpentine River was being reconstructed on Sunset Creek, near Teller, and is said to have been operated for a short time late in September and early in October. In the Fairhaven precinct only one dredge was operating, that on Candle Creek. Low water in the spring again prevented the movement of the Iver Johnson dredge from the Kugruk to Candle Creek. The dredge on the Inmachuk was idle also.

It is reported that on Bonanza Creek, a tributary of Ungalik River, at the base of Seward Peninsula, dredging ground was purchased and some development work was done upon it.

The following is a list of gold dredges operating in 1919 on Seward Peninsula, in addition to which two tin dredges were also working in the Port Clarence precinct:

NOME DISTRICT.

Dexter Creek Dredging Co	Dexter Creek.
Arctic Creek dredge	Arctic Creek.
Center Creek Dredging Co	Snake River.
Wm. Rowe	Snake River.
Guinan & Ames	Glacier Creek.
Julien Mining Co	Osborn Creek.
Alaska Mines Corporation	Flat Creek.

COUNCIL DISTRICT.

Fernegal & Hanson dredge	Crooked Creek.
Wild Goose Mining & Trading Co	Ophir Creek.
Blue Goose Mining Co	Ophir Creek.
Northern Light Mining Co	Ophir Creek.
G. & O. dredge (formerly Elkhorn dredge)	Niukluk River.
Uplift Mining Co	Niukluk River.
Flume Gold Dredging Co	Melsing Creek.
Adams & Wik	Goose Creek.

SOLOMON DISTRICT.

Eskimo Dredging Co	Solomon River.
Shovel Creek Gold Dredging Co	Solomon River.
Flower dredge	Solomon River.
Burners, Iverson & Johnson dredge	Big Hurrah Creek.

KOUGAROK DISTRICT.

Behring Dredging Co	Kougarok River.

FAIRHAVEN DISTRICT.

Candle Creek Mining Co	Candle Creek.

PORT CLARENCE DISTRICT.

Dr. Andrews	Sunset Creek.

Most of the dredges use distillate for fuel, though some are using crude oil. A number of dredges are equipped with internal-combustion engines, and a few have been equipped for electric operation, including the Wild Goose dredge at Council, which obtains hydroelectric power generated by ditch water, and the Flat Creek dredge at Nome, which obtains its power from a steam-driven turbo-generator fired with fuel oil.

During the summer of 1919 a representative of the company that is planning to develop hydroelectric power from a plant in the Kigluaik Mountains was in Nome making a survey of potential power

users on Seward Peninsula. Should it prove feasible to develop power from this source, at a reasonable cost, the plant should solve the often difficult problem of fuel for the dredges of the Nome, Council, and Solomon districts and should prove a potent factor in the dredging of the large areas of low-grade auriferous gravels in the vicinity of Nome.

It is estimated that the 22 gold dredges on Seward Peninsula in 1919 employed 183 men and had a gold yield of $450,000, compared with a yield of $469,000 by 21 dredges in 1918.

UNDERGROUND MINING.

There was a very notable decrease in both underground and open-cut mining on Seward Peninsula during 1917 and 1918, and this decrease continued in 1919. It is to be attributed to a number of causes. The high-grade placers, which can be mined profitably by small-scale operations, are gradually approaching exhaustion. Those that are not exhausted are being consolidated into larger holdings, to be mined more economically by larger operations extending over a period of years. The increased cost of practically all supplies, of transportation, and to a lesser extent of labor have made unprofitable the mining of much ground which could formerly have been worked at a profit. The higher wages paid in the manufacturing industries in the Western States for the labor formerly employed, much of it skilled or semiskilled, have attracted and held many of those formerly engaged in mining, so that there is an actual shortage of labor for the mining industry. As a result there are fewer men engaged in the search for and development of new deposits during those seasons of the year when relatively little mining is being done.

In 1919 about 17 deep placer mines were worked in Seward Peninsula. It is estimated that 10 mines were worked during the winter and 7 in the summer, employing about 78 men. The operations so far as known were distributed as indicated in the following list:

Deep placer gold mines worked on Seward Peninsula, 1919.

	Number of mines.	Men employed.
Nome district	4	10
Fairhaven district	7	28
Koyuk district	6	40
	17	78

By far the largest part of the production from the deep placer mines was made during the winter, and operations of this type were relatively less productive in the summer of 1919; moreover, there were fewer mines in operation.

OPEN-CUT WORK.

In the summer of 1919, 74 open-cut mines, including 24 hydraulic plants, were operated, employing an approximate total of 332 men. Operations were distributed by districts as follows:

Open-cut gold placer mines on Seward Peninsula, 1919.

	Hydraulic plants.	Other open-cut operations.	Men employed.
Nome district	9	8	140
Solomon district	4	1	13
Council district	2	1	21
Kougarok district	4	18	42
Fairhaven district	5	10	81
Port Clarence district	.....	7	14
Koyuk district	.....	5	21
	24	50	332

Included in the list of hydraulic operations are the plants using Ruble elevators on Bear Creek and at Candle, in the Fairhaven district. Two plants in the Nome district and one on Inmachuk River used hydraulic lifts. Under "Other open-cut operations" are placed three plants, two of which were engaged in the preparation of ground for dredging and one in the construction of a ditch preparatory to mining.

PRODUCTION.

There were 91 gold placer mines and 22 gold dredges operated on Seward Peninsula in 1919. Approximately 550 men were employed in these operations, and the production is estimated at $1,400,000.

Gold and silver produced on Seward Peninsula, 1897–1919.

Year.	Gold.		Silver.	
	Quantity (fine ounces).	Value.	Quantity (fine ounces).	Value.
1897	725.63	$15,000	87	$52
1898	3,628.12	75,000	435	256
1899	135,450.00	2,800,000	16,254	9,752
1900	229,781.25	4,750,000	27,574	17,097
1901	199,822.61	4,130,700	24,579	14,747
1902	220,677.07	4,561,800	26,481	14,035
1903	215,994.38	4,465,000	24,171	13,052
1904	201,462.52	4,164,600	24,175	14,021
1905	232,200.00	4,800,000	27,864	16,997
1906	352,812.50	7,500,000	43,537	29,605
1907	338,625.00	7,000,000	25,497	16,828
1908	247,680.00	5,120,000	20,577	10,905
1909	207,077.50	4,260,000	20,871	10,853
1910	169,312.50	3,500,000	20,317	10,971
1911	149,962.50	3,100,000	17,996	9,718
1912	145,125.00	3,000,000	17,415	10,710
1913	120,937.50	2,500,000	12,094	7,305
1914	130,612.50	2,700,000	15,673	8,667
1915	140,287.50	2,900,000	17,510	8,878
1916	142,706.25	2,950,000	14,271	9,391
1917	125,775.00	2,600,000	13,770	11,346
1918	53,599.50	1,108,000	6,022	6,022
1919	65,790.00	1,360,000	6,940	7,773
	3,830,044.83	79,360,100	424,110	258,981

TIN.

The dredges of the American Tin Mining Co. and the York Tin Dredging Co. were both in operation in 1919, the American on Buck Creek and the York on Grouse Creek. Three men were engaged in shoveling into sluice boxes on Buck Creek above the dredge. A total of 25 men were engaged in tin mining, and the production was about 56 tons.

In addition to the recovery in the York region a few hundred pounds of tin concentrates were saved in connection with gold mining on Humboldt Creek, a tributary of Goodhope River. These concentrates were not shipped in 1919.

PLATINUM.

In 1919, as in previous years, platinum was recovered with the gold on Bear, Dime, and Sweepstakes creeks at the base of Seward Peninsula. The production was probably about 20 ounces.

LODE MINING.

There was relatively little lode mining on Seward Peninsula in 1919. Assessment work was done on a few properties, and title to other claims, on which no assessment work was done, was maintained by the filing of the necessary affidavits.

GOLD.

One gold lode mine near Bluff is said to have operated during the winter, and the ore mined was milled during the summer by means of water power.

TIN.

A crew of about 12 men is reported to have worked at the tin mine on Lost River during the winter of 1918-19, and about 25 men during the summer. The winter work consisted mainly of retimbering, enlargement of drifts and shafts, and deepening of shafts. A number of buildings were erected, and a compressor plant was installed to furnish air for drills and for ventilation. A large warehouse was also built on the beach at the mouth of the river. A considerable shipment of mining machinery and supplies for this property was unloaded at the mouth of Lost River from the freighter *Cordova* in October, 1919.

SILVER-LEAD.

The silver-lead prospect on Kugruk River near Independence Creek was further developed during 1919, a crew of 6 to 14 men working throughout the year. The work appears to have consisted mainly in sinking the shaft. Data regarding the amount of lateral development are not at hand. A considerable amount of ore has been mined during the development work but has not been shipped

owing to difficulties of transportation. An effort is said to have been made to get a shipment of ore down the Kugruk in small scows. Low water during the spring when a high stage was expected prevented these boats from getting down the river. Additional development work was to be done during the winter of 1919-20.

The principal difficulty in operating this property seems to lie in the transportation of supplies to the mine and of the ore from the mine. The experience in 1919 indicates that shipments of ore down the river will probably not prove feasible, and it will doubtless be necessary to haul the ore to Candle or Deering. The Candle road has been constructed from Candle as far up Candle Creek as claim No. 16, and it will probably prove most economical to extend this road to the mine rather than to build all the way to Deering. An aerial tram may prove more economical than road haulage, should it be found that a large tonnage will have to be handled. The possibility of developing power for the operation of the tram from the coal found on the Kugruk may make this method of haulage the most economical.

COAL.

Coal has been obtained for a number of years from the Kugruk coal beds, having been mined on Chicago Creek and on the Kugruk between Reindeer and Montana creeks. This coal is used extensively in Candle and Deering at times when the supply from British Columbia or Washington is insufficient for heating and generating power for mining.

Applications for permits to mine coal for two years at these two localities were made and permits granted during September, 1919. It is the intention of the operators to mine coal for the local use of Candle and Deering and for use at the silver-lead mine on the Kugruk. Most of the product of these mines will be hauled in winter.

A permit was also issued in September, 1919, to mine coal on the Koyuk 1½ miles from its mouth, presumably for use on Dime Creek.

In 1918 three permits to mine coal on Unalaklik River for two years were issued, and some coal was hauled by small vessels to Nome and St. Michael, but none was reported for 1919.

OIL DRILLING.

Additional drilling has been done near Hastings Creek in the endeavor to find oil, a hole 350 feet in depth being reported. As indicated by Cathcart,[3] the drilling is being done in an area of metamorphic and igneous rocks—formations which contain no oil—and the hopes of obtaining oil in this locality are ill founded

[3] Cathcart, S. H., Mining in northwestern Alaska: U. S. Geol. Survey Bull. 712, p. 197, 1920.

INDEX.

RECENT SURVEY PUBLICATIONS ON ALASKA.

[Arranged geographically. A complete list can be had on application.]

All these publications can be obtained or consulted in the following ways:

1. A limited number are delivered to the Director of the Survey, from whom they can be obtained free of charge (except certain maps) on application.

2. A certain number are delivered to Senators and Representatives in Congress for distribution.

3. Other copies are deposited with the Superintendent of Documents, Washington, D. C., from whom they can be had at prices slightly above cost. The publications marked with an asterisk (*) in this list are out of stock at the Survey but can be purchased from the Superintendent of Documents at the prices stated.

4. Copies of all Government publications are furnished to the principal public libraries throughout the United States, where they can be consulted by those interested.

The maps whose price is stated are sold by the Geological Survey and not by the Superintendent of Documents. On an order amounting to $5 or more at the retail price a discount of 40 per cent is allowed.

GENERAL.

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*The geography and geology of Alaska, a summary of existing knowledge, by A. H. Brooks, with a section on climate, by Cleveland Abbe, jr., and a topographic map and description thereof, by R. U. Goode. Professional Paper 45, 1906, 327 pp. No copies available. May be consulted at many public libraries.

*Placer mining in Alaska in 1904, by A. H. Brooks. In Bulletin 259, 1905, pp. 18–31. 15 cents.

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*Tin resources of Alaska, by F. L. Hess. In Bulletin 520, 1912, pp. 89–92. 50 cents.

*The petroleum fields of the Pacific coast of Alaska, with an account of the Bering River coal deposits, by G. C. Martin. Bulletin 250, 1905, 64 pp. 15 cents.

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*Methods and costs of gravel and placer mining in Alaska, by C. W. Purington. Bulletin 263, 1905, 362 pp. No copies available. (Abstract in Bulletin 259, 1905, pp. 32–46, 15 cents.)

*Prospecting and mining gold placers in Alaska, by J. P. Hutchins. In Bulletin 345, 1908, pp. 54–77. 45 cents.

*Geographic dictionary of Alaska, by Marcus Baker; second edition prepared by James McCormick. Bulletin 299, 1906, 690 pp. 50 cents.

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TOPOGRAPHIC MAPS.

Map of Alaska (A); scale 1 : 5,000,000; 1912, by A. H. Brooks. 20 cents retail or 12 cents wholesale.

Map of Alaska (B); scale 1 : 1,500,000; 1915, by A. H. Brooks and R. H. Sargent. 80 cents retail or 48 cents wholesale.

Map of Alaska (C); scale 1 : 12,000,000; 1916. 1 cent retail or five for 3 cents wholesale.

Map of Alaska showing distribution of mineral deposits; scale 1 : 5,000,000; by A. H. Brooks. 20 cents retail or 12 cents wholesale. New editions included in Bulletins 642 and 662.

Index map of Alaska, including list of publications; scale 1 : 5,000,000; by A. H. Brooks. Free.

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*The Porcupine placer district, Alaska, by C. W. Wright. Bulletin 236, 1904, 35 pp. 15 cents.

*Economic developments in southeastern Alaska, by F. E. and C. W. Wright. In Bulletin 259, 1905, pp. 47–68. 15 cents.

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A barite deposit near Wrangell, by E. F. Burchard. In Bulletin 592, 1914, pp. 109–117.

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